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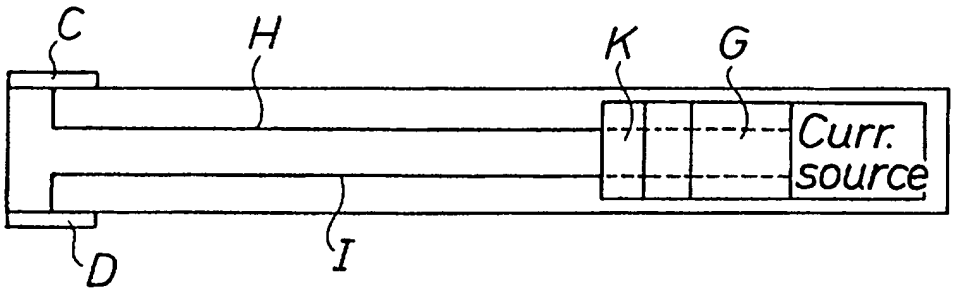

(57) Abstract

The invention relates to a measuring instrument for the measurement of an existing pain or a feeling of nausea of a patient. The measuring instrument induces pain in an arbitrary body part of said patient, by supplying an electrical current. The measuring instrument provides a current increase into said body part, until said induced pain is experienced by the patient as being as great as the existing pain/nausea. The current is supplied from a current source arranged in the measuring instrument via wires (H, I) and electrodes (C, D), said electrodes being applied onto that part of the body in which pain is to be induced. When the pain induced is experienced to be as great as the existing pain/nausea, the body part is removed from the electrodes, whereupon a pain value is registered and shown on a display (F).

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MEASURING OF PAIN

AREA OF THE INVENTION

The present invention relates to a measuring instrument and a method of measuring, by means of said instrument, an existing pain experienced by a patient.

STATE OF THE ART

When a person in need of medical treatment first comes into contact with a doctor, a physiotherapist, a nurse etc., this person generally tries to describe his pain verbally, so that the medical staff are at least able to make a primary diagnosis of the patient's condition and suggest a suitable treatment. However, this creates a significant problem for the medical staff, depending upon different persons experiencing, and therefore describing, their pain or symptoms in different ways. One person may e.g. be more resistant to pain than others. Another person may e.g. have become used to his pain after a certain period of time and may therefore describe his/her pain in milder terms than he/she would have done if the pain had arisen recently. The varying descriptions of pain which a diagnostician may be exposed to, complicate a quick and exact diagnosis of a person's ailment or injury.

For the sake of simplicity, in the below text the patient is always referred to as being male. It should of course be understood, however, that the same applies to female patients.

In order to hitherto measure pain in patients, doctors, physiotherapists etc. use a so called measuring rod or ruler; this technique is called Visual Analogue Scale (VAS). The general design of a measuring rod having a VAS scale is

shown in Figures 1 and 2. There is, however, a variety of different designs of this measuring rod, but their function is generally the same and will be described with reference to Figures 1 and 2.

As can be seen from Fig. 1, the measuring rod is divided into grades from e.g. 0-10, where "0" means no sensation of pain and where "10" means unbearable sensation of pain or worst possible sensation of pain. Fig. 2 shows the reverse side of the measuring rod of Fig. 1, and during a measurement the patient will only see this side.

Suppose a patient having a pain in his arm goes e.g. to a doctor. The doctor picks up his ruler (measuring rod) and asks the patient if he can describe his sensation of pain by placing his finger on that spot on the ruler which best corresponds to the sensation of pain in his arm. The doctor has of course previously explained to the patient how the ruler functions, i.e. that one end A of the ruler corresponds to no sensation of pain and the other end B of the ruler corresponds to an unbearable sensation of pain (Fig. 2).

Assume that the patient places his finger on the ruler at a value of "7" on the pain scale (0-10). The scale on the ruler is turned towards the doctor so that only he can see the pain scale (Fig. 1) and the patient can only see the reverse side of the ruler as shown by Fig. 2.

The doctor thus quickly obtains information about how the patient at present subjectively experiences the pain in his arm.

The doctor then prescribes a treatment for the patient, e.g. some kind of painkiller.

When the patient comes for his next visit to the doctor, the same procedure with the ruler is repeated, and the patient now places his finger at a location on the ruler which e.g. corresponds to the value "2" on the pain scale (0-10).

The doctor thus obtains an indication that the pain in the arm has decreased; the doctor of course comparing the previous value of "7" with the present value of "2". Thus, the doctor can conclude that the treatment has been effective.

If the patient during his next visit instead places his finger at a location on the ruler which e.g. corresponds to the pain value of "8,5", the doctor can instead determine that the previous treatment has been ineffective, and he can therefore act accordingly; e.g. prescribe a new medicine or a referral to a physiotherapist, a masseur etc. The doctor thus uses the measuring rod to determine whether a treatment has been effective or not.

One problem with this ruler according to Figures 1 and 2 is that the patient must consciously think about and evaluate where to place his finger on the ruler, between the values no sensation of pain and unbearable sensation of pain, as shown in Fig. 2. The patient is all the time aware of, that the closer he places his finger in relation to the end A of the ruler, i.e. no sensation of pain, the less pain he is supposed to sense, and the closer he places his finger in relation to the end B of the ruler, i.e. unbearable sensation of pain, the more pain he is supposed to sense. This awareness of the patient is just what the present invention eliminates.

Another problem with the ruler according to Figures 1 and 2 is that the doctor cannot objectively verify the pain value given by the patient; the patient may e.g. lie about his sensation of pain and place his finger at the same pain value at different measurement occasions.

A further problem with the ruler according to the Figures 1 and 2 is that different persons sense pain in different ways.

Some persons can stand pain better than others and will describe their pain with a low value (e.g. "2") on the ruler; other persons have a low pain threshold and will describe the same pain with a high value (e.g. "9") on the ruler.

The present invention eliminates also this problem.

In order to find out if the previous art solves the problems mentioned above, a pre-study was performed, whereby the following documents were found.

The document EP,B1 0 438 541 describes a portable instrument performing a multidimensional indication of pain sensed by a person. The portable instrument has indicators

that may be adjusted by a person to provide a physical indication of the type of pain intensity being sensed by said person.

The document US,4 641 661 describes an electronic meter for determining the pain threshold for a pressure applied to the skin surface of a patient. The pressure is increased until the patient presses a button when he/she senses pain. The pressure achieved is registered.

The document US,4 697 599 describes a device for localisation and detection of pain by measurement of the conductivity of the tissue.

The document US,5 020 542 shows a method for measuring the sensibility of the skin of a patient to electrical stimulation.

The document JP,7 023 964 describes a method for measuring pain objectively and quantitatively.

The document GB,2 049 431 describes a so called measuring rod for providing a subjective measurement of the pain sensed by the patient.

The documents found do not solve the problems mentioned above.

SUMMARY OF THE INVENTION

Thus, the object of the present invention is to solve the above problems.

Another object of the present invention is to allow an objective way of performing the pain measurement.

Yet another object of the present invention is to provide a measurement value of pain which is relevant for comparison between different patients.

A further object of the present invention is to provide a portable, very easy to use, measuring instrument for the measurement of pain.

Yet a further object of the present invention is to allow the doctor, the physiotherapist etc. to feel and sense the patient's pain, which has a psychological significance that may entail a shortened time for medical care of the patient, as the patient feels he has been understood.

These objects are achieved by a device and a method according to the characterising parts of the appended patent

claims 1 and 16, respectively.

Advantageous embodiments of the present invention are described in the dependent claims.

Detailed embodiments of the present invention will now be described with reference to the enclosed drawings.

SHORT DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a principle design of a measuring rod (ruler) according to the state of the art, seen from the front;

Fig. 2 shows the measuring rod of Fig. 1 seen from the rear;

Fig. 3 shows a cross sectional view from above of a first embodiment of the measuring instrument according to the invention;

Fig. 4 shows a side view of the measuring instrument of Fig. 3;

Fig. 5 shows a second embodiment of the measuring instrument according to the invention;

Fig. 6 shows a cross sectional view from above of a third embodiment of the measuring instrument according to the invention;

Fig. 7 shows a side view of the measuring instrument of Fig. 6;

Fig. 8 shows a cross sectional view from above of a fourth embodiment of the measuring instrument according to the invention;

Fig. 9 shows a fifth embodiment of the measuring instrument according to the invention; and

Fig. 10 shows a cross sectional view from above of a sixth embodiment of the measuring instrument according to the invention;

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

In the following, each of the embodiments mentioned according to Figures 3-10 will be discussed. The first embodiment of the invention will be described in more detail, as this embodiment will also describe the idea of

the invention by means of an example.

The other embodiments are based on the same inventive idea.

Referring now to Figures 3 and 4, two electrodes C and D are attached, one on each side, at one end of the measuring instrument. The electrodes are connected by wires I and H to a current source, where the current is controlled by a control knob E.

At one side of the measuring instrument there is a display F, capable of showing, e.g. digitally, a value of e.g. 0-10. This value is of course intended for indication, in the same way as before, of a degree of pain sensed, where the value "0" corresponds to a total absence of pain and the value "10" corresponds to an unbearable pain.

Furthermore, there is a memory register G for storage of an arbitrary number of pain readings (0-10).

The present invention will now be described by way of an example, with reference to Figures 3 and 4.

Assume that a patient having pains in his arm comes to a doctor. The doctor produces his measuring instrument according to the first embodiment, and asks the patient to take a steady grip with e.g. his index finger and thumb around the electrodes C and D.

The doctor now informs the patient that a current will be supplied to the electrodes, the increase of which will be controlled by the doctor via the control knob E. The doctor further informs the patient that he will sense a pain in the index finger and thumb that are grasping the electrodes C and D; as the current increases, the pain in the fingers will increase accordingly. The doctor now informs the patient that he should release the grip around the electrodes C and D when the pain in his fingers is experienced to be as great as the pain in the bad arm.

The doctor thus increases the current through the wires H and I with the control knob E, and when the patient senses that the pain in his fingers is as great as the pain in the bad arm he releases his grip around the electrodes C and D, whereupon a pain reading, e.g. "7,8" is registered in the memory G and is displayed digitally on the display F. This pain value is of course proportional to the magnitude of the

current.

When the patient returns after treatment, the same procedure is repeated, whereupon the pain reading "2" is registered. Thus, the doctor now knows, in the same manner as before, that the treatment has been effective.

The above described measuring instrument according to the present invention however differs markedly from the earlier measuring rod according to Figures 1 and 2, through the patient associating, by means of the measuring instrument according to the present invention, a pain (in his fingers) with another pain (in his bad arm).

The patient thus releases the grip around the electrodes C and D when the pain in his fingers is experienced as being as great as the pain in his arm, and the patient thus has no idea about which pain reading on the scale (0-10) he causes.

When the patient uses the measuring instrument according to the present invention, he will not refer to any greatest (unbearable sensation of pain) or smallest (no sensation of pain) pain value as with the measuring rod according to Figures 1 and 2.

The pain measurement according to the present invention is thus objective in the sense that the patient cannot consciously determine what pain value he will obtain, as it is the comparison between the pain in his fingers and the pain in his arm that is his reference, not any visual pain scale.

Furthermore, as a given pain value corresponds to a given current level, pain values between different patients can be compared. It is thus possible, based on the pain values, to determine objectively that a certain patient will endure greater pain than another patient; this is e.g. not possible with the measuring rod according to Figures 1 and 2. With the measuring instrument according to the present invention the doctor can easily check if the patient is "lying" about his pain by performing an arbitrary number of measurements and comparing the pain values from the different measurements; if approximately the same pain value is obtained throughout all measurements it can be regarded as reasonable that the patient speaks the truth.

The doctor can also experience the pain which the patient senses, by grasping himself around the electrodes C

and D; this may be of psychological importance to the patient and entail a shortening of his time in medical care.

Fig. 5 shows a second embodiment of the measuring instrument according to the invention. This embodiment differs from the measuring instrument in Figures 3 and 4 only by the current to the electrodes C and D being increased by means of a push-button J.

By depressing this button J, the current is thus increased in an arbitrary, predetermined fashion; for example 50 µA upon each depression.

The Figures 6 and 7 show an especially preferred embodiment of the measuring instrument. This embodiment functions in such a way that when e.g. the thumb and the index finger grasp around the electrodes C and D, a current circuit is closed, whereby a current flows from the current source via the wire H and the electrode C through the thumb and the index finger, and back to the current source via the electrode D and the wire I. The current increases automatically by steps of e.g. 50 µA, being controlled by a microprocessor K. Furthermore, the microprocessor may be programmed so as to control the current increase in a linear or exponential manner. The microprocessor also controls the time it will take for the current to increase from a minimum current to a maximum current.

When the current has increased to such an extent that the patient experiences the pain in his thumb and index finger to be as great as the pain in e.g. his bad arm, the patient releases his grip around the electrodes C and D, whereupon the current circuit is interrupted, and the current value is registered, in the same manner as before, in the memory G and shown on the display F. This measuring instrument according to Figures 6 and 7 is thus very easy to handle and user friendly, as it only needs for the patient tc grasp with his thumb and index finger around the electrodes C and D, whereupon the current increase takes place fully automatically. The measuring instrument according to Figures 6 and 7 may also be equipped with a stop button (not shown) for stopping the automatic current increase. When the patient depresses this stop button, the automatic current increase will stop, causing the current source only to feed

a constant current, corresponding to the current flowing immediately before the stop button was depressed.

This stop button may be used, for example, when the doctor wants to experience the current strength that the patient senses. This is thus performed through the patient stopping the current increase when the existing pain (e.g. his bad arm) is experienced as being as great as the pain caused by the current, by depressing the stop button, whereupon the doctor grasps, with his fingers, around the electrodes C and D. It may, as mentioned before, have a certain psychological impact, that the doctor can experience the patient's pain, as the patient may then feel understood. If the stop button is depressed again, the current will resume its automatic increase.

Fig. 8 shows a fourth embodiment of the measuring instrument. This measuring instrument in principle functions in the same manner as the measuring instrument of Figures 6 and 7; the current will increase automatically when the current circuit is closed (i.e. when the electrodes C and D are short-circuited).

This measuring instrument however differs from the earlier described measuring instruments by having its electrodes C and D arranged in such a manner as to be applicable anywhere on the body. This measuring instrument is especially advantageous for use with extremities which are paired, e.g. arms, legs, ears, etc.

Assume for example that a patient has a pain in his left knee. The doctor then applies the electrodes C and D of the measuring instrument according to Fig. 8 onto the patient's right knee, whereupon pain is also induced in this knee. The measuring instrument according to Fig. 8 thus utilises the principle that it is easier for a patient to associate a pain in his left knee with a pain in his right knee; it is easier to compare pain sensations in similar body parts. The sensation of pain in each side of the body is transferred independently to the brain. Consequently, the sensitivity in a certain area of the body can be compared to that in a reference area on the opposite side thereof.

In the embodiments of the measuring instrument according to the present invention, it should be understood that it is

also possible to reduce the current via the push-button J or the control knob E. In one embodiment of the present invention it will be possible to combine the automatic current increase and the stop button with the push-button J or the control knob E.

It will also be possible for a patient to perform the pain measurement himself, in the absence of a doctor, physiotherapist, etc. In this case, the pain values are not shown on the display F but are only stored in the memory G, so as not to inform the patient about them. The doctor may subsequently, by means of a certain button (not shown) retrieve these values from the memory G and show them on the display means.

The memory G will be designed so that arbitrary information, such as e.g. time, date, various patient names with their respective series of pain values etc., may be stored. There will also be a possibility for printing out this information on e.g. a strip of paper.

Fig. 9 shows an especially preferred embodiment of the measuring instrument which is a combination of the measuring instrument of Figs. 6 and 7 and the measuring instrument of Fig. 8. This measuring instrument is thus designed on the one hand to be grasped around the electrodes L and M with the fingers, on the other to be applicable onto an arbitrary body part via the electrodes N and O, in the same way as described before.

In order for the patient to receive adequate pain stimulation in the body part which is touched by the electrodes, it is necessary to secure a predetermined minimum pressure against the electrodes.

One way of achieving this is to see to it that this predetermined minimum pressure corresponds to the force required to grasp the electrodes C and D by the thumb and index finger and at the same time to hold the measuring instrument in a horizontal position. In this case it will be required that a string is attached to an arbitrary position on the measuring instrument, whereby e.g. the doctor holds the other end of the string, to prevent the instrument from falling to the floor when the patient releases the electrodes C and D. If the doctor is increasing or decreasing

the electrode current manually, in this case, when the measuring instrument is in a horizontal position, an external hand-held control is required. The hand-held control is then connected to the measuring instrument by a wire and thus replaces the push-button J and the control knob E. If the current increase is automatic, naturally no external hand-held control is necessary.

Yet another method for arranging this predetermined minimum pressure on the electrodes is to use a resilient contact as shown in Fig. 10. In this case, the electrodes must be pressed inwards until they touch the contacts P and Q, whereby the current circuit is closed. This pressure for closing the circuit is consequently so matched as to achieve an adequate pain stimulation.

It should be understood that the measuring instrument according to the embodiments described above is a portable instrument that can easily be carried by e.g. a doctor. The length of the instrument will principally correspond to the length of the previous measuring rod. However, the instrument will be somewhat thicker than the previous measuring rod, as this instrument has to contain a certain amount of electronics.

The measuring instrument preferably comprises at least a battery, a means of upwards transformation of voltage, a microprocessor for display control etc., and possibly memory circuits. The pain scale to be utilised preferably runs from 0,0 - 9,9, 0 - 60 or 0 - 99.

It has been shown, empirically, that the pain measurements with this measuring instrument functions in a very satisfactory way when the following measurement method is used:

- the patient grasps around the electrodes (C, D) with his right thumb and index finger;
- the current is increased automatically when the circuit is closed (alternatively, the patient has to press the start button in order to start the automatic current increase);
- when the pain in his fingers is experienced as being as great as his existing pain in e.g. a knee, the patient depresses the stop button. The automatic current increase

ceases and the stimulation remains constant. The patient will at this point try "once extra", that the pain in his fingers is as great as the existing pain;

- the patient then releases his tweezers grip around the electrodes (C, D). If the patient thinks the pain in his fingers is lower than the existing pain, he may push the stop button again, making the current increase automatically, etc. It is thus not until the patient releases his tweezers grip (open circuit), that the measurement is terminated;

- the doctor depresses the value button, the pain value is shown on the LCD, and the pain value is noted down.

It is to be understood that the stop button is arranged at such a location on the measuring instrument as to be easily accessible for the patient.

It is further foreseen that the measuring instrument (the pain meter) will be used for pain measurements outside the hospital. A large application area is pain measurement during studies of pharmaceutical drugs. The pain meter must then follow the patient 24 hours/day.

The patient will perform the pain measurement himself as described above, with the difference that upon a finished measurement, the pain value is saved in a memory and the pain meter is switched off automatically. The patient consequently will not see the measured pain value. After e.g. four weeks the patient goes to see his doctor. The doctor takes the pain meter and connects it to a computer, preferably via an interface. The saved pain values are transferred to the computer for further analysis/processing. Examples of data saved are patient name/birth data, date (each measurement), time (each measurement), and pain value (each measurement). It is also conceivable that the pain meter includes a system for making the patient aware of that it is time to perform a measurement, or that the pain meter is integrated into a system where this function is available.

In the foregoing, we have only discussed a comparison between an induced pain and an existing pain. It is of course to be understood, that the measuring instrument according to the invention may be used to compare an induced

pain with, in general, an arbitrary feeling. If, for example, a patient feels ill at ease, this feeling may be compared with a pain induced into the patient by means of the measuring instrument. The invention is especially intended for also allowing the comparison between a pain induced by the measuring instrument and sensations of nausea. It is to be understood that in the concept of pain, we also include unpleasant sensations.

The quintessence of the present invention, however, is that the patient receives a physical stimulus (electrical current) into a part of his body, and compares said induced pain in this body part with an existing pain (e.g. his bad arm) or with a feeling of nausea. When the induced pain in the body part coincides with the existing pain/nausea sensation, the pain value is registered through the patient actively causing the induced pain to cease.

In this way the pain may be objectively graded, with the physical stimulus (the current) as reference, i.e. there is no reference to any fixed values running from "no sensation of pain" to "worst possible sensation of pain".

It is to be understood that the physical stimulus does not necessarily have to be an electrical current; it could also be a mechanical pressure or application of heat.

The above description is only to be regarded as advantageous embodiments of the invention, and the scope of the invention is only defined by the contents of the accompanying patent claims.

CLAIMS

1. Measuring instrument for measuring the existing pain in an arbitrary part of the body of a patient, or the nausea of a patient, **characterised** in that it induces pain into said patient by supplying a physical stimulus, and in that it provides an increase in said physical stimulus until said induced pain is experienced, by said patient, to be as great as said existing pain/nausea.

2. Measuring instrument according to claim 1, **characterised** in that when said induced pain is experienced to be as great as said existing pain/nausea, said patient causes said induced pain to cease, whereby said measuring instrument will register a pain value corresponding to said existing pain.

3. Measuring instrument according to claim 2, **characterised** in that said physical stimulus is an electrical current.

4. Measuring instrument according to claim 3, **characterised** in that it is portable and comprises electrodes (C, D), wiring (H, I), a current source, a display means (F) and memory circuits (G), the electrodes being arranged for application onto an arbitrary part of the body of said patient, for delivery of electrical current.

5. Measuring instrument according to claim 3, **characterised** in that it is portable and comprises electrodes (C, D), wiring (H, I), a current source and memory circuits (G), the electrodes being arranged for application onto an arbitrary part of the body of said patient, for delivery of electrical current, whereby pain values are registered in said memory circuits (G), said pain values being transferable to a computer for analysis/processing through said measuring instrument being connected to said computer, preferably via an interface.

6. Measuring instrument according to claims 4 or 5, **characterised** in that said current increases successively and induces pain in said body part of the patient, whereby, when said induced pain is experienced to be as great as said existing pain/nausea, said body part is removed from said electrodes (C, D) and said current is interrupted, whereby a pain value is registered in memory circuits (G) and dis-

played on said display means (F), if such a device is provided on said measuring instrument.

7. Measuring instrument according to claims 5 or 6, **characterised** in that said electrodes (C, D) are provided at one end, and on opposite sides, of said measuring instrument, to be grasped preferably by the fingers.

8. Measuring instrument according to claims 5 or 6, **characterised** in that said electrodes (C, D) are provided closely beside each other at one end, and on the same side, of said measuring instrument, for application onto an arbitrary part of the body of said patient.

9. Measuring instrument according to claims 5 or 6, **characterised** in that electrodes (L, M) are provided at one end, and on opposite sides, of said measuring instrument, to be grasped preferably by the fingers, and that electrodes (N, O) are provided closely beside each other at one end, and on the same side, of said measuring instrument, for application onto an arbitrary part of the body of said patient.

10. Measuring instrument according to any one of claims 4-9, **characterised** in that it has a resilient contact between said electrodes (C, D, M, L, N, O) and contacts (P, Q), a predetermined minimum pressure against said electrodes being required to press them inwards against said contacts (P, Q), whereby current is supplied to said electrodes.

11. Measuring instrument according to any one of claims 7-10, **characterised** in that the current is increased automatically when the electrodes (C, D, M, L, N, O) are short-circuited.

12. Measuring instrument according to any one of claims 7-10, **characterised** in that the current increase is controlled by a control knob (E).

13. Measuring instrument according to any one of claims 7-10, **characterised** in that the current increase is controlled by a push-button (J).

14. Measuring instrument according to any one of claims 4-13, **characterised** in that a stop button is provided to stop the current increase when said button is depressed, whereby, if said button is depressed anew, the current will resume its automatic increase.

15. Measuring instrument according to any one of claims 11-14, **characterised** in that it comprises a battery means, means for upwards transformation of voltage, a microprocessor for control of the display means, memory circuits, etc.

16. Method for measuring, by means of a measuring instrument, the existing pain in an arbitrary part of the body of a patient, or the nausea of a patient, **characterised** in that pain is induced into said patient by supplying a physical stimulus to said patient by means of said measuring instrument, and in that said physical stimulus is increased by said measuring instrument until said induced pain is experienced, by the patient, to be as great as said existing pain/nausea.

17. Method according to claim 16, **characterised** in that said patient causes said induced pain to cease when said induced pain is experienced to be as great as said existing pain/nausea, whereupon a pain value corresponding to said existing pain/nausea is registered.

18. Method according to claim 17, **characterised** in that said physical stimulus is an electrical current.

19. Method according to claim 18, **characterised** in that said measuring instrument used is portable and comprises electrodes (C, D), wiring (H, I), a current source, a display means (F) and memory circuits (G), said electrodes being applied onto that part of the body in which pain is to be induced.

20. Method according to claim 19, **characterised** in that said electrical current is successively increased and induces a successively increasing pain in said body part of the patient, whereby, when said current, inducing pain in said body part, has increased to an extent where said induced pain is experienced by the patient to be as great as said existing pain/nausea, said body part is removed from said electrodes (C, D) whereupon the current is interrupted and said pain value is registered in said memory circuits (G) and are displayed on said display means (F).

21. Method according to claim 20, **characterised** in that said electrodes (C, D) are provided at one end, and on opposite sides, of said measuring instrument, to be grasped pre-

ferably by the thumb and index finger.

22. Method according to claim 20, **characterised** in that said electrodes (C, D) are provided closely beside each other at one end, and on the same side, of said measuring instrument, for application onto an arbitrary part of the body of said patient.

23. Method according to any one of claims 21 or 22, **characterised** in that the current increases automatically when the electrodes (C, D) are short-circuited by said arbitrary body part.

24. Method according to claim 23, **characterised** in that a patient with an existing pain, e.g. a bad knee, or being nauseous, grasps around the electrodes (C, D) with his thumb and index finger, whereby said current flows from the current source via the wire (H) and the electrode (C) through the thumb and index finger and back to the current source via the electrode (D) and the wire (I), said current increase thereby occurring automatically, preferably in steps of 50 μA, by means of a microprocessor (K), and when the pain induced by the current in the index finger and thumb, respectively, is experienced by the patient as being as great as the existing pain/nausea, the patient removes his index finger and thumb from the electrode, whereby the current circuit is interrupted and a pain value corresponding to the existing pain/nausea is displayed on said display means (F).

25. Method according to any one of claims 21 or 22, **characterised** in that the current increase is controlled by a push-button (J).

26. Method according to any one of claims 16-25, **characterised** in that said pain value may assume values on a pain scale from 0 - 10, 0 - 60 or 0 - 99.

27. Method according to any one of claims 23-25, **characterised** in that it comprises the following steps:

a) the patient grasps around the electrodes (C, D) with the thumb and index finger of one hand;

b) the current is increased automatically when a closed circuit is created, or the patient depresses a start button to start the automatic current increase;

c) when the pain in the fingers (thumb, index finger) is

experienced as being as great as the existing pain in an arbitrary body part, or a feeling of nausea, said patient depresses a stop button, whereupon the automatic current increase ceases and the stimulation remains constant.

d) the patient checks once again that the pain in the fingers is as great as said existing pain/nausea;

e) if the patient thinks the pain in his fingers is lower than said existing pain, he pushes the stop button again, making the current increase again.

f) when the patient is sure about the pain in his fingers coinciding with said existing pain/nausea, he releases the grip around the electrodes (C, D) whereby the measurement is terminated.

28. Method according to claim 27, **characterised** in that when the measurement is terminated, a doctor depresses a value button, whereby the pain value is shown on a display (F), whereupon the doctor makes a note of the pain value.

29. Method according to claim 27, **characterised** in that the patient performs the pain measurement himself, preferably at home, whereby, when the measurement is terminated, the measured pain value is stored in memory circuits (G) in such a way that the patient will not be informed about said pain value, whereupon consecutive measurements are performed by the patient during an arbitrary period of time during which said measured pain values are stored in said memory circuits (G); and in that when the patient, after an arbitrary period of time, returns to the doctor, he will give the measuring instrument to said doctor, who connects the measuring instrument to a computer, preferably via an interface, whereby said pain values are transferred to said computer for analysis/processing.

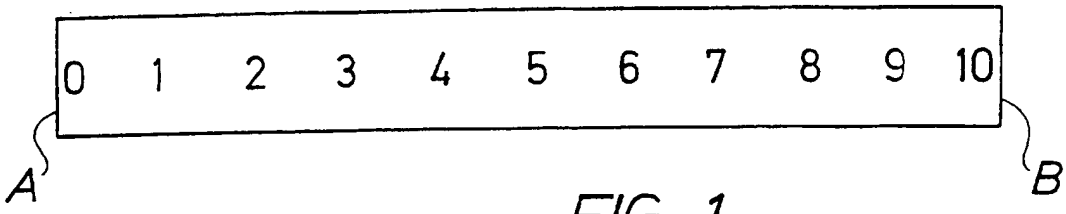

FIG. 1

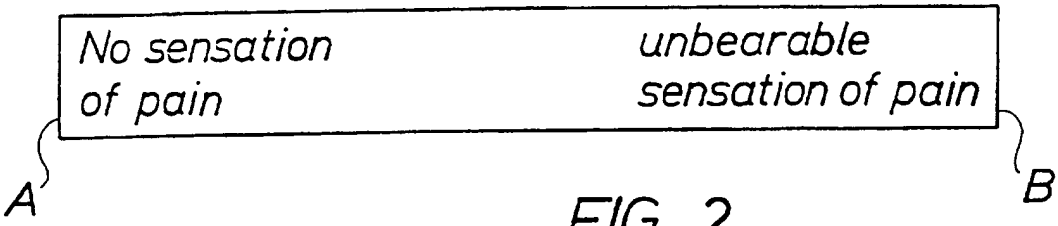

FIG. 2

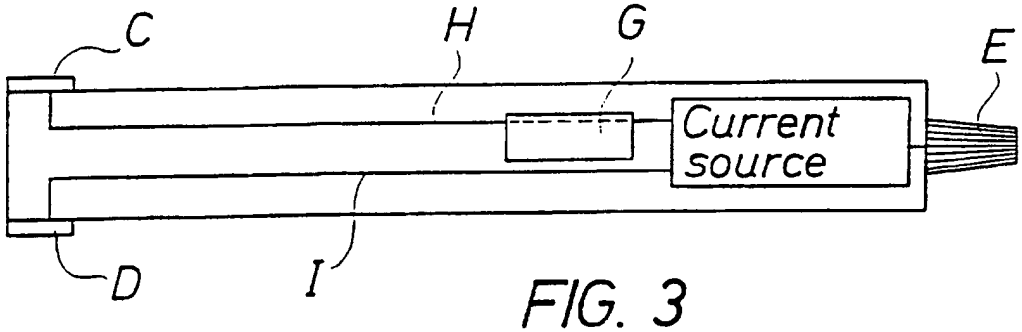

FIG. 3

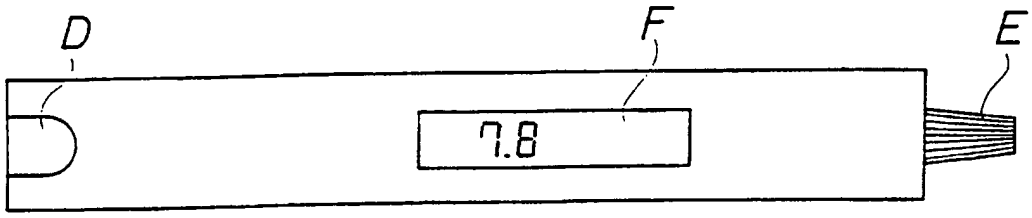

FIG. 4

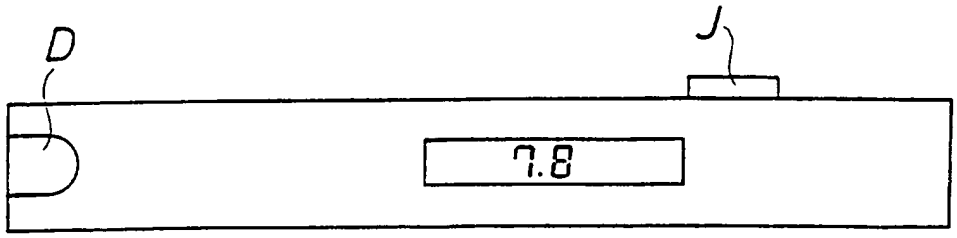

FIG. 5

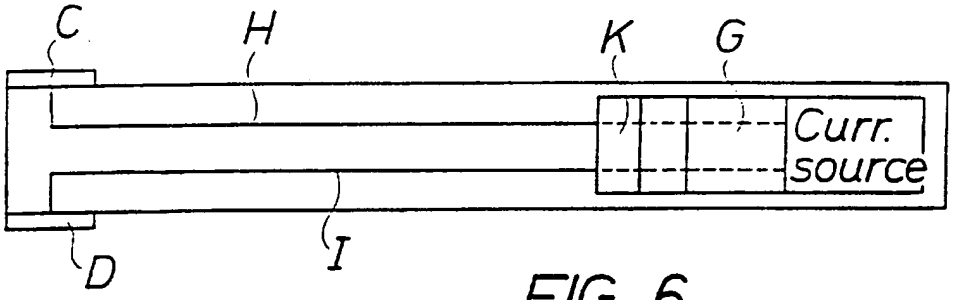

FIG. 6

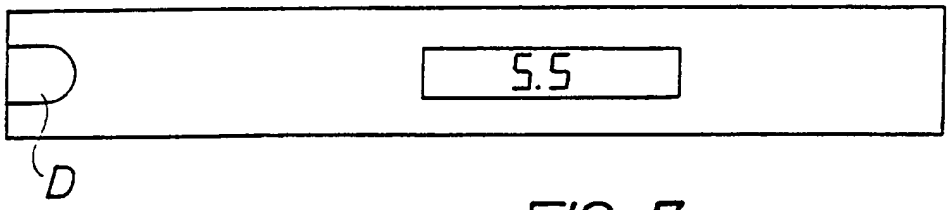

FIG. 7

FIG. 8

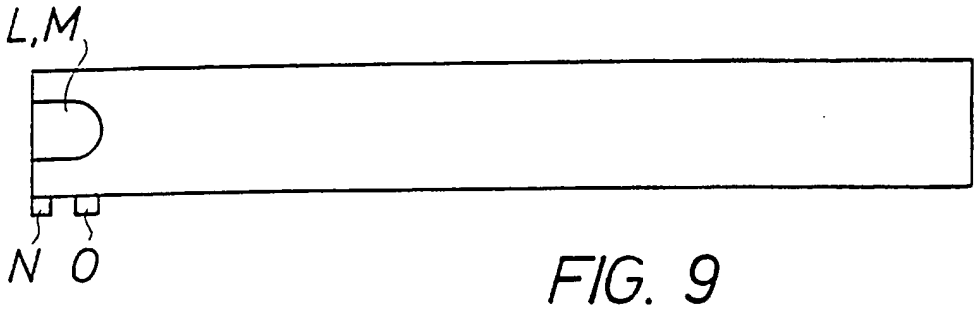

FIG. 9

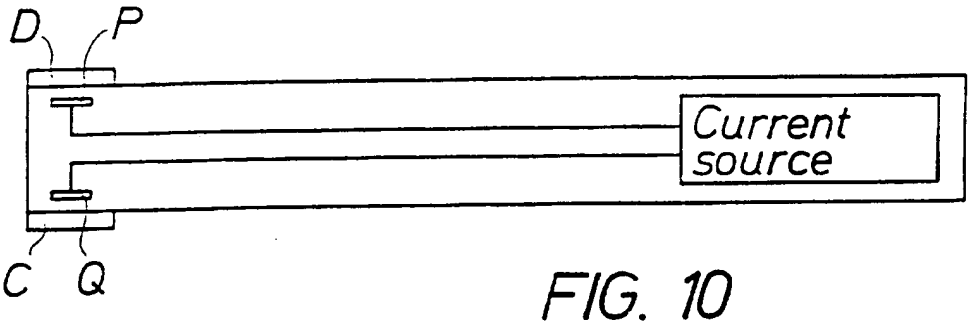

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 96/01668

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61B 5/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4485823 A (A.YAMAGUCHI ET AL.), 4 December 1984 (04.12.84), figure 1, abstract --	1,16
A	US 5020542 A (CH.ROSSMANN ET AL.), 4 June 1991 (04.06.91), figures 1-6, abstract --	1,16
A	US 4164214 A (M.M.STARK ET AL.), 14 August 1979 (14.08.79), figure 1, abstract --	1,16
A	US 1842323 A (L.J.B.GLUZEK), 19 January 1932 (19.01.32), abstract --	1,16

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 May 1997	12-05-1997
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Lars Jakobsson Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 96/01668

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	DE 2753109 A1 (P.F.MANDEL), 7 June 1979 (07.06.79), abstract --	1,16
P	US 5485852 A (L.L.JOHNSON), 23 January 1996 (23.01.96), figures 1,2, abstract --	1,16

INTERNATIONAL SEARCH REPORT
Information on patent family members

02/04/97

International application No.
PCT/SE 96/01668

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		JP 62009341 B	27/02/87
US 5020542 A	04/06/91	NONE	
US 4164214 A	14/08/79	NONE	
US 1842323 A	19/01/32	NONE	
US 4641661 A	10/02/87	NONE	
DE 2753109 A1	07/06/79	NONE	
US 5485852 A	23/01/96	NONE	